Mathematics Toolkit: Grade 6 Objective 2.A.2.d

Standard 2.0 Knowledge of Geometry

Topic A. Plane Geometric Figures

Indicator 2. Analyze geometric relationships

Objective d. Identify and compare the relationship between parts of a circle

Assessment Limits:

Use radius, diameter and circumference (π=3.14)

Table of Contents

Objective 2.A.2.d Tools

Lesson Seeds

Mathematics Grade 6 Objective 2.A.2.d Assessment Limit 1

Materials needed

string, rulers and/or yardsticks, various round shapes (container lids, toys, small tires, etc.)

Activities

- Discuss with students the meaning of the terms radius, diameter, and circumference of a circle. The radius of a circle is a line segment from the center of a circle to a point on the circle. The distance around a circle, is called the circumference. It is like the perimeter of a polygon. A diameter of a circle is a segment that passes through the center of the circle and connects two points of the circle.

- Determine the relationship between the radius and diameter of the same circle. In partners, the students will trace each circular object on a piece of paper. They will draw one diameter and one radius for each traced circle. To do this they will have to estimate where the center lies. They can do this by folding the paper so that the circle is reflected on itself. This will give them one diameter. If they repeat the process, the point of intersection of the two folds will be the center. They will then measure the radius and diameter of each circle and record those measurements on a chart that has a space for Length of Radius, Length of Diameter and Circumference. Partners will then make a conjecture about the relationship between the radius and the diameter. Students as partners will share their results and note that $d = 2r$ where d is the length of the diameter and r is the length of the radius.

- In partners, the students measure the circumference of each of the circular objects by first determining the length of string it takes to go around the object and then measuring the string with a ruler and/or yardstick. The circumference measure is recorded on the same chart that has a space for Length of Radius, Length of Diameter, Circumference and $\frac{\text{Circumference}}{\text{Length of diameter}}$ for each object. They will use calculators to determine the ratio of the circumference to the length of the diameter and record that ratio on the same chart for each object. Partners will then make a conjecture about the relationship between the length of the diameter of a circle and its circumference. Students as partners will share their results and note that the circumference is a little more than 3 times the length of the diameter. Discuss with students that this relationship was the same no matter how large or small the circle and discuss why this is true. [As the circumference increases, the diameter increases for a given circle. The ratio remains constant.] Discuss the symbol assigned to the ratio of the circumference to the length of the diameter for any circle as π. An approximation for π as a decimal is 3.14. An approximation for π as a fraction is $\frac{22}{7}$.

- Develop the relationship between the circumference and length of the radius of the circle using what you know about the diameter. Write the relationships algebraically.
$C = \pi d$ or $C = 2\pi r$

- Determine the circumference of a circle given either the length of the diameter or the length of the radius. Use either 3.14 or $\frac{22}{7}$ as an approximation for π. Select examples for students that require them to choose the value for π that makes computation most efficient.
- The activity can be extended to include unknown objects in which students are given one measurement and must determine the others.

Sample:

Object	Radius	Diameter	Circumference	$\frac{\text{Circumference}}{\text{Length of Diameter}}$
Butter container lid				
CD				
Button				
Unknown item #1	4 ft.			
Unknown item #2		16 m		
Unknown item #3			50.24 in.	

Answers:

Object	Radius	Diameter	Circumference	$\frac{\text{Circumference}}{\text{Length of Diameter}}$
Butter container lid	$2\frac{3}{8}$ in.	$4\frac{3}{4}$ in.	15 in.	
CD	6.1 cm	12.2 cm	38.3 cm	
Button	2.9 cm	5.8 cm	18.2 cm	
Unknown item #1	4 ft.	8 ft.	25.12 ft.	
Unknown item #2	5 m	10 m	31.4 m	
Unknown item #3	8 in.	16 in	50.24 in.	

Great resource to teach parts of a circle: Sir Cumference and the First Round Table, Cindy Neuschwander, Wayne Geehan, Charlesbridge Publishing, 1997.